

## ABSTRACT OF THE DISCLOSURE

[173] The invention provides methods and compositions for engineering cells to generate large amounts of hydrogen. Genes that are involved in hydrogen production pathways and genes that are upregulated when cells are exposed to conditions conducive to the generation of hydrogen are mutagenized according to disclosed protocols. Microbes containing nucleic acid constructs are screened or selected for the ability to generate an increased amount of hydrogen. Methods of producing hydrogen are also disclosed.